





















Routing Protocol Categories

Data Plane

- Local next-hop forwarding:
 - Consult forwarding table for a next hop
 - Completely local decision
- Source routing:
 - Source node places complete path in packet header
 - Intermediate nodes don't have to consult their forwarding tables







DSR: Assumptions

- Cooperative environment
- Links Asymmetric / Symmetric both
- Network diameter small but larger than 1
- Nodes may work in promiscuous mode (explained in the next slide)







DSR: Path Discovery

- When node S wants to send a packet to node D, but does not know a route to D, node S initiates a route discovery.
- Source node S floods the network with route request (RREQ) packets (also called query packets).
- Each node appends its own address in the packet header when forwarding RREQ.

















Route Reply in DSR (symmetric link case)

- Destination D on receiving the first RREQ, sends a Route Reply (RREP)
- RREP is sent on a route obtained by reversing the route appended to received RREQ
- RREP includes the route from S to D on which RREQ was received by node D





Route Reply in DSR (asymmetric case)

- If unidirectional (asymmetric) links are allowed, then RREP may need a route discovery for S from node D
 - Unless node D already knows a route to node S
 - If a route discovery is initiated by D for a route to S → potential cause of deadlock.
 - The Route Reply is piggybacked on the Route Request from D.









- Route discovery + Route Reply + Route Error = Routing Overhead.
- Competes with Data transmission
- How to cut down routing Overhead?
 - No cut down possible at Route Reply (RREP)
 - No cut down possible in Route Error (RERR)
 - Only possibility: cut down Route Discovery

(RREQ) Achievable through caching

DSR Optimization (Caching)

- Each node caches a new route it learns by any means
- · Caching overheard routing information
 - In presence of uni-directional link
 - In presence of bi-directional link



































Dynamic Source Routing: Disadvantages

- Non-scalable: Packet header size grows with route length due to source routing
- Care must be taken to avoid collisions between route requests propagated by neighboring nodes
 - insertion of random delays before forwarding RREQ

Dynamic Source Routing: Disadvantages

 Too much caching: Increases contention if too many route replies come back due to nodes replying using their local cache
Date Park Other parking

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Route Reply Storm problem

Dynamic Source Routing: Disadvantages

- An intermediate node may send Route Reply using a stale cached route, thus polluting other caches
 - [•] This problem can be eased if some mechanism to purge (potentially) invalid cached routes is incorporated.
 - For some proposals for cache invalidation, see [Hu00Mobicom]
 - Static timeouts
 - Adaptive timeouts based on link stability

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